

DIETARY NOTES ON SOME KENYAN BIRDS

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INTRODUCTION

Between late 1974 and the end of 1976 a number of dead birds was found near Voi township, southeastern Kenya, often within Tsavo National Park (East). Most of these were road casualties. Their stomach contents were preserved and later analysed and this paper reports on these findings supplemented by some behavioural observations on the birds by PCL.

Thirty-eight individuals of 28 species are involved, eleven of five species being nightjars for which otherwise no observations were made.

Scientific names of birds follow Forbes-Watson (1971) and are given in the Appendix; English names are from Mackworth-Praed & Grant (1957, 1960).

RESULTS

The complete analyses are given in the Appendix and only some of the more interesting points are commented on below. Frequently only parts of a particular prey item were found, such as the wing-cases or thorax of a beetle, and it has been assumed that in these the whole of the item had been taken by the bird and that we simply did not find the missing parts; this did not apply to ants (see below). The size of the prey is therefore given as an estimated total length unless otherwise stated.

DISCUSSION

Almost all bird species considered here are known to be primarily insectivorous, and it is not surprising therefore that insects and other arthropods form the vast majority of the items found. Of these, four groups appear especially important and so are considered first.

Termites Termites are almost ubiquitous in Tsavo, though they are not necessarily immediately obvious to an avian predator as they do much of their foraging concealed in sand tunnels, which they build as humidity regulating structures. Also, as a general rule, they are most active at night. However, they are one of the most important food sources for birds in Tsavo, and for many they form a substantial part of the diet. This is particularly true of ground-feeding species. How much protection is afforded by the sand tunnels is not known; birds certainly have no trouble breaking into them but only a few of the tunnels will be in use at any one time.

Termites are also an important secondary source of food for species which are primarily granivorous and form a valuable source of protein. In this sample the Green-winged Pytilia is an example; it is known to feed mainly on seeds taken from the ground, yet the bird reported here contained 93 termites. The termites occur in exactly the same places as the seeds this species eats.

Termite alates, though not recorded here, are eaten by many species including some not generally associated with insect-eating. In Tsavo alates are relatively scarce except during very short periods immediately after rain storms and are thus unimportant as more than a very temporary food source (cf. Thiollay 1970).

Ants These too are nearly ubiquitous in Tsavo. They are most common on the ground but may also occur in foliage where they can become important to frugivores as well as to the granivores on the ground, cf. termites

above. The Speckled Mousebird in the sample had taken one.

Some ants are capable of giving a more or less unpleasant sting. It is possible that some birds have developed a de-stinging behaviour (see Birkhead 1974 for a review). Ants missing the ends of their abdomens were noted in several species, but only in the Golden-breasted Starling and one of the Gabon Nightjars were the ants' abdomens damaged in a way which might have indicated such behaviour, but in neither of these cases had they been taken in quantity.

Alate ants form a temporary source of food comparable to termite alates for the limited period they are flying.

Beetles A large number of beetles occurs throughout the sample. Indeed only four individuals, apart from the primarily frugivorous Speckled Mousebird and granivorous Green-winged Pytilia, had not taken any. Even the near-exclusively granivorous Laughing Dove had taken one. The other four, Grey-headed Kingfisher, Red and Yellow Barbet, Slate-coloured Boubou and Three-streaked Bush Shrike, are mainly insectivores, and the lack of beetles is no doubt due simply to chance.

To do more than superficially summarize the familial distribution would be treading on dangerous ground, but two families seem especially well represented, Scarabaeidae and Curculionidae. At least 22 birds had taken at least one of either and the largest number of one family were the 43 Scarabaeidae taken by the Red-billed Hornbill. Perhaps surprisingly, the European Swallows had taken quite large numbers of both. Not all the Scarabaeidae were from coprophagous sub-families but the majority were which shows the importance of mammalian dung to insectivorous bird species. Many species, including all three hornbills, in this sample have been seen feeding from dung-piles. The larger species were no doubt seeking the beetles, but termites, the other major dung remover in Tsavo (Coe 1976), are obviously an important secondary attraction and probably the main one for the smaller species, including the starlings.

Ladybird beetles (Coccinellidae) are normally considered distasteful to most birds yet the von der Decken's Hornbill had taken one.

Grasshoppers These had been taken by ten birds, six of them nightjars. They are a very important, if not the main, food source for species which normally sit on an elevated perch and pounce on to the ground or into the grass (pers. obs.). There are four such species in this sample (five individuals), European Roller, Grey-headed Kingfisher, Red-tailed Shrike and White-crowned Shrike and three of these had taken some.

One of the Dusky Nightjars had taken 13 grasshoppers with red hind-wings which are probably designed as flash-warning colouration. The night-jar is, of course, nocturnal and so would perhaps not see this colour, but these particular grasshoppers were possibly not distasteful, perhaps the colouration was used for mimicry.

Other Arthropods The White-browed Coucal seems to have a preference for giant ground crickets; all three specimens had eaten them though no other bird in this sample had. However, the Red-billed Hornbill and the Grey Hornbill have both been seen to eat some at other times. These insects can be quite unpleasant when handled by man; besides struggling forcibly they produce large quantities of a brown liquid from their mouths and, upon further provocation, a clearer liquid can be produced from the body as well. In addition, they can also inflict painful bites.

Scorpions too might be thought equally unpleasant, yet both a White-

browed Coucal and a Grey-headed Kingfisher had eaten one although the sting was only found in the kingfisher. Similarly, spiders were eaten by both species and a shieldbug (Pentatomidae) by the coucal. Cuckoos in general are well known to eat hairy caterpillars and so perhaps the White-browed Coucal, although belonging to a separate sub-family, may have similar adaptations to deal with distasteful prey, but we can find no reference to this.

Another unusual type of food item found was mantis egg capsules. These are often stated as having a protective covering yet the Yellow-billed Hornbill and Three-streaked Bush Shrike had both eaten clusters whole, the only damage being perfectly consistent with that required to remove them from their substrate.

Other foods Several species were recorded as having taken seeds and other vegetable matter and in no case is this inconsistent with what is known of their feeding habits from observations.

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REFERENCES

- BIRKHEAD, T.R. 1974. Predation by birds on social wasps. *British Birds* 67: 221-229.
- COE, M.J. 1977. The role of termites in the removal of elephant dung in Tsavo (East) National Park, Kenya. *East African Wildlife Journal* 15: 49-55.
- THIOLLAY, J.M. 1970. L'exploitation par les oiseaux des essaimages de fourmis et termites dans une zone de contact savane-fôret en Côte d'Ivoire. *Alauda* 38: 255-273.

APPENDIX

For each individual a list is given of all the items found in the stomach and/or crop. Where size seems important it is given as an estimate of the total length, unless otherwise stated; (w.s. = wingspan)

Vanellus coronatus Crowned Lapwing

Voi Sisal Estate 4 February 1976

7 beetle larvae (Cerambycidae), head capsule width 1.5 - 5 mm; beetle, 10 mm; ant; termite.

Cursorius cinctus Heuglin's Courser

On main road about 10 km north of Voi 10 August 1976; male

Beetle (Scarabaeidae), 9 mm; beetle larva; ant; 109 worker and 5 soldier termites.

Streptopelia senegalensis Laughing Dove

Aruba 18 December 1976

Beetle, 7 mm; c.250 black seeds 2 mm in diameter (?*Chloris* sp.).

Turtur chalcospilos Emerald-spotted Wood Dove

Near Voi Gate 29 October 1975, female

c.45 various seeds, 2.5 mm in diameter.

Centropus superciliosus White-browed Coucal

1. Near Park Headquarters 21 June 1975

2 ground crickets (Hetrodinae, *Enyaliopsis*); 4 grasshoppers; beetle (Curculionidae), 7 mm; beetle (?Tenebrionidae), 14 mm; beetle, 11 mm; hymenopteran (?Chrysididae); 2 shield bugs, cryptic grey; cockroach, 11 mm; spider (Lycosidae or Pisauridae).

2. Near Voi Gate 2 April 1976, male

5 ground crickets (Hetrodinae; *Enyaliopsis*), mandibles only; 4 grasshoppers; beetle (Curculionidae), 15 mm; 2 ants; 3 cockroaches, 18 mm; scorpion, 50 mm; spider (Mygalomorph), 70 mm body length; possible remains of a spider, 7 mm.

3. Near Voi 11 April 1976, female

6 ground crickets (Hetrodinae; *Enyaliopsis*), mandibles only; 3 beetles (Curculionidae), 15 - 18 mm.

Caprimulgus donaldsoni Donaldson-Smith's Nightjar

1. On main road about 3 km north of Voi 2 March 1976, male

5 beetles of various families, 5 - 15 mm, the largest a Staphylinid; ant alate.

2. Junction of the Tsavo and Athi Rivers 15 August 1976, juvenile

Beetle (Scarabaeidae), 12 mm; beetle (Curculionidae), 6 mm; beetle, 3.5 mm.

3. Half way between Voi and Lugard's Falls 30 October 1976

4 beetles (Scarabaeidae), 13 mm; beetle (Cerambycidae), 13 mm; beetle, 8 mm; caterpillar (Lepidoptera), 20 mm; 21 moths, w.s. 8 - 35 mm.

Caprimulgus inornatus Plain Nightjar

1. Taita Hills Lodge 27 March 1975

Grasshopper; orthopteroid; 15 beetles, 22 mm and 2, 6 mm, all Scarabaeidae; 3 beetles (Carabidae); 2 beetles (Elateridae), 8 mm; beetle (?Anthicidae), 10 mm; 4 ants; 36 termite alates.

2. Near Voi Gate 18 December 1975

2 grasshoppers; 2 beetles (Scarabaeidae) 12 mm; beetle (?Cerambycidae), 15 mm; 13 moths, w.s. 25 - 40 mm; 3 antlion adults (Myrmecolionidae), w.s. 55 mm.

Caprimulgus fossii Gabon Nightjar

1. Near Aruba 26 January 1975

3 beetles (3 spp. of Scarabaeidae), 11 - 21 mm; beetle (Elateridae), 21 mm; 2 moths, w.s. 30 mm.

2. Near Voi Gate 1 February 1975

28 grasshoppers, 90% adults; 2 beetles (Scarabaeidae), 12 mm; 2 ant alates (missing the apex of gasters); bug (Heteroptera), 5 mm.

3. Near Voi Safari Lodge 1 February 1975

27 grasshoppers; 2 beetles (Scarabaeidae), 10 mm; 2 moths, w.s. 30 mm; 2 unidentified objects, diameter 3 mm, possibly seeds.

Caprimulgus europaeus European Nightjar

Half way between Voi and Lugard's Falls 30 October 1976

Beetle (Scarabaeidae), 10 mm; beetle, 15 mm; moth (Sphingidae), w.s. 100 mm; 7 moths, w.s. 20 mm; ant, alate of *Dorylus* sp., 25 mm.

Caprimulgus fraenatus Dusky Nightjar

1. Near Voi 7 December 1976

13 grasshoppers with red hindwings, 1 60 mm, 12, 30 mm; 2 beetles of 2 species, 13 mm.

2. Near Voi 31 December 1976

5 grasshoppers, 35 - 55 mm; 8 beetles (Scarabaeidae, 2 spp.), 6, 20 mm, 2, 10 mm; beetle (Cerambycidae), 20 mm; 5 beetles (various), 8 mm; moth, w.s. 30 mm.

Colius striatus Speckled Mousebird

Ndololo 19 April 1976, male

Ant; green soft fruity material.

Halcyon leucocephala Grey-headed Kingfisher

Voi River near Sagala 4 February 1976

Grasshopper; 2 cockroaches, 12 and 25 mm; caterpillar (Sphingidae), 18 mm; spider (Lycosidae), 13 mm; 2 scorpions, 25 mm and 50 mm (sting present).

Coracias garrulus European Roller

1. Voi Sisal Estate 4 February 1976, male

12 beetles (Curculionidae), 13 - 25 mm; 2 beetles (sand-mimicking Tenebrionidae), 15 - 18 mm.

2. Tsavo River 16 November 1976

2 beetles (Carabidae), 15 mm; beetle (Cicindelidae), 18 mm; beetle (Gyrinidae), 15 mm; 4 caterpillars, 20 - 30 mm.

Upupa epops African Hoopoe

Voi River near Sagala 4 February 1976

Beetle (Scarabaeidae), 17 mm; 3 cockroaches, 15 - 30 mm.

Tockus erythrorhynchus Red-billed Hornbill

Half way between Voi and Aruba 20 March 1976, male

43 beetles (Scarabaeidae), 18 mm, 11 mm and 41 at 7 mm (?Aphodinae); 2 ants; bug (Heteroptera); antlion larva; 90 seeds, diameter 3 mm; plant stalk, 6 mm.

Tockus deckeni von der Decken's Hornbill

On main road about 20 km north of Voi 17 December 1974

Orthopteran; 3 beetles (Curculionidae), 2 at 16 mm and 1 at 8 mm; beetle (Coccinellidae), 8 mm; beetle (Chrysomelidae, Halticinae), 2 mm; 15 ant alates; 6 seeds (*Commiphora* sp.); 32 seeds; seed (?grass).*Tockus flavirostris* Yellow-billed Hornbill

Near main road about 5 km north of Voi 2 February 1976

2 beetles (Cerambycidae), 13 mm; 17 ants (aff. *Campanotus*); 2 termites; mantis; mantis egg cluster, intact; 19 intact fly pupari; spider (Lycosidae), 17 mm; 13 seeds and stalks of *Commiphora* sp.; 4 seeds of 2 sorts, up to 13 mm; leaf material in quantity.*Trachyphonus erythrocephalus* Red and Yellow Barbet

Park Headquarters 18 June 1975

Beetle (Scarabaeidae), 9 mm; 3 termite workers: 7 berries of 2 species, diameter 5 - 6 mm.

Hirundo rustica European Swallow

1. Near Park Headquarters 19 December 1975

Beetle (Scarabaeidae), 5 mm; 13 beetles (Curculionidae), 6 - 10 mm.

2. Half way between Voi and Aruba 20 December 1975

6 beetles (Scarabaeidae, 3 species), 4.5 mm; 9 beetles of 6 species including 1 Curculionidae (Apioninae); 13 ant alates (Myrmecinae); 9 ant alates; typhid wasp; 2 braconid wasps, 2 mm; ichneumonid wasp, 6 mm; 9 flies including Sepsidae and Tachinidae; bug (Heteroptera), 11 mm; wing scales of Lepidoptera.

Eurocephalus rueppellii White-crowned Shrike

Voi Gate 18 December 1976

Beetle (Scarabaeidae), 25 mm; beetle (Cerambycidae), 25 mm; beetle, 7 mm.

Tchagra jamesi Three-streaked Bush Shrike

Park Headquarters 19 December 1974

Cockroach; mantis egg cluster with most of protective coating present; moth, w.s. 30 mm.

Laniarius fuscus Slate-coloured Boubou

Near Voi Gate 2 April 1976

4 termites (3 workers and 1 alate); ant; bee; wasp (?Vespidae); butterfly w.s. 30 mm; tick (male *Amblyomma variegatum*).

Lanius collurio (isabellinus) Red-tailed Shrike

On main road about 25 km south of Voi 22 January 1976

Locust adult; beetle (?Carabidae), 25 mm; caterpillar (Lepidoptera), 25 mm; thin legs of a spider (?Pholcidae); seed, diameter 1 mm.

Luscinia luscinia Sprosser

Park Headquarters 15 November 1975

Beetle (?Carabidae), 8 mm; 2 ants; 3 ants (eyeless); possible remains of a smaller beetle.

Cisticola chiniana Rattling Cisticola

Near Voi Gate 2 April 1976, female

Beetle, 3 mm; moth, w.s. 30 mm.

Pytelia melba Green-winged Pytilia

Half way between Voi and Aruba 17 April 1975, male

93 termites (86 workers and 7 soldiers); 26 seeds, diameter 2 mm.

Bubalornis niger Red-billed Buffalo Weaver

Near Voi Gate 17 December 1976

Beetle, 10 mm; 14 assorted caterpillars, 20 mm; fly, 8 mm; snail, 4 mm.

Cosmopsarus regius Golden-breasted Starling

Voi Sisal Estate 4 February 1976, male

Beetle (Scarabaeidae), 10 mm; 130 termites; 2 ants (without abdomens); seed (*Commiphora* sp.); seed, diameter 2 mm; plant material; sand grains.

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